

PCT

WORLD INTELLECTUAL PROPERTY ORGANIZATION
International Bureau



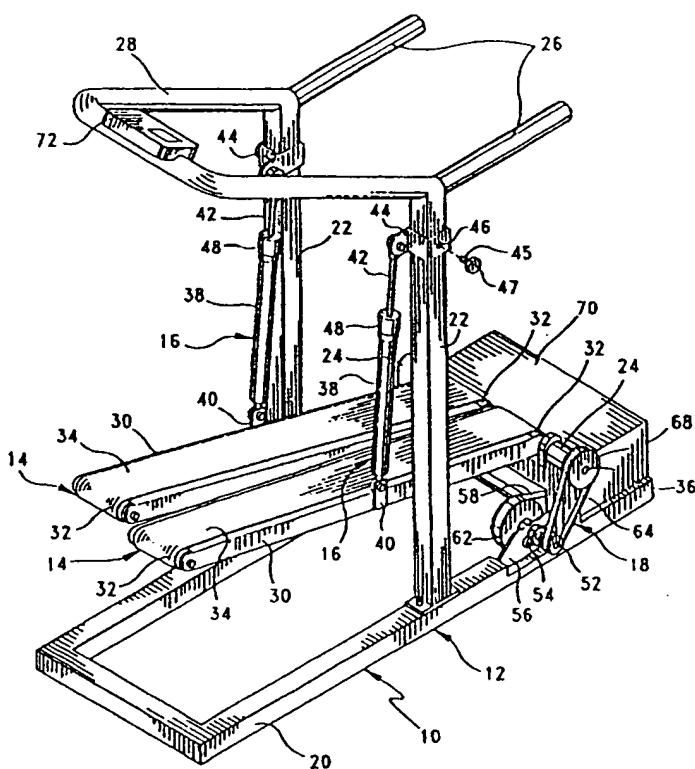
INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification 6 : A63B 22/00, 22/04	A1	(11) International Publication Number: WO 95/16502 (43) International Publication Date: 22 June 1995 (22.06.95)
(21) International Application Number: PCT/US94/14694		(81) Designated States: AM, AT, AU, BB, BG, BR, BY, CA, CH, CN, CZ, DE, DK, EE, ES, FI, GB, GE, HU, JP, KE, KG, KP, KR, KZ, LK, LR, LT, LU, LV, MD, MG, MN, MW, NL, NO, NZ, PL, PT, RO, RU, SD, SE, SI, SK, TJ, TT, UA, US, UZ, VN, European patent (AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG), ARIPO patent (KE, MW, SD, SZ).
(22) International Filing Date: 13 December 1994 (13.12.94)		
(30) Priority Data: 168,025 15 December 1993 (15.12.93) US		
(71)(72) Applicants and Inventors: PIAGET, Gary, D. [US/US]; 3390 American Saddler Drive, Park City, UT 84060 (US); GORDON, Trace, O. [US/US]; 3880 W. Lariat Road, Park City, UT 84060 (US).		Published <i>With international search report.</i>
(74) Agents: SALTER, Elliot, A. et al; Salter & Michaelson, 321 South Main Street, Providence, RI 02903 (US).		

(54) Title: **TREADMILL WITH DUAL RECIPROCATING TREADS**

(57) Abstract

A treadmill device includes a frame (12) and two side by side treadmills (14) each having a continuous tread (34) and first and second ends. The first ends of the two treadmills are pivotally supported on a base portion of the frame by a roller shaft (32) which extends through the treadmill rollers. The second ends of the treadmills are independently supported by spring return hydraulic cylinders (38) which are connected between the treadmills and spaced support members of the frame. The continuous treads are driven by a motor (18) which is coupled to the roller shaft. The treadmills alternately pivot up and down as a user walks thereon.



BEST AVAILABLE COPY

FOR THE PURPOSES OF INFORMATION ONLY

Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

AT	Austria	GB	United Kingdom	MR	Mauritania
AU	Australia	GE	Georgia	MW	Malawi
BB	Barbados	GN	Guinea	NE	Niger
BE	Belgium	GR	Greece	NL	Netherlands
BF	Burkina Faso	HU	Hungary	NO	Norway
BG	Bulgaria	IE	Ireland	NZ	New Zealand
BJ	Benin	IT	Italy	PL	Poland
BR	Brazil	JP	Japan	PT	Portugal
BY	Belarus	KE	Kenya	RO	Romania
CA	Canada	KG	Kyrgyzstan	RU	Russian Federation
CF	Central African Republic	KP	Democratic People's Republic of Korea	SD	Sudan
CG	Congo	KR	Republic of Korea	SE	Sweden
CH	Switzerland	KZ	Kazakhstan	SI	Slovenia
CI	Côte d'Ivoire	LJ	Liechtenstein	SK	Slovakia
CM	Cameroon	LK	Sri Lanka	SN	Senegal
CN	China	LU	Luxembourg	TD	Chad
CS	Czechoslovakia	LV	Lithuania	TG	Togo
CZ	Czech Republic	MC	Monaco	TJ	Tajikistan
DE	Germany	MD	Republic of Moldova	TT	Trinidad and Tobago
DK	Denmark	MG	Madagascar	UA	Ukraine
ES	Spain	ML	Mali	US	United States of America
FI	Finland	MN	Mongolia	UZ	Uzbekistan
FR	France			VN	Viet Nam
GA	Gabon				

1 **TREADMILL WITH DUAL RECIPROCATING TREADS**

2 **Background and Summary of the Invention:**

3 The instant invention relates to exercise apparatus
4 and more particularly to a treadmill having two side-by-
5 side treads which reciprocate up and down during use
6 thereby providing the benefits of both walking and stair
7 climbing.

8 Treadmill-type walking apparatus and stair climbing
9 apparatus have heretofore been known in the art. In this
10 connection, the U.S. Patents to Speer, Sr. No. 4,204,673;
11 Lee et al No. 4,938,473; and Trulaske No. 5,114,388
12 represent the closest prior art to the subject invention
13 of which the applicant is aware. The patent to Speer Sr.
14 discloses a treadmill having dual treads which are
15 independently operated to provide a separate control of
16 speed and/or resistance for each leg. The tread
17 platforms are stationary and do not move relative to each
18 other. The patent to Lee et al concerns a treadmill
19 having a trampoline-like surface. The Lee treadmill
20 includes a continuous tread which is supported at the
21 peripheral edges by a plurality of springs. The spring-
22 supported tread is resilient enough to absorb shock and
23 rigid enough to provide a stable exercising surface.
24 There are no rigid supporting surfaces beneath the tread.
25 The Patent to Trulaske discloses a stair exerciser
26 including pivotable stair platforms. The stair platforms

1 reciprocate up and down as the user alternately steps up
2 with each foot.

3 The instant invention provides a treadmill apparatus
4 having dual treads which pivot up and down. Briefly, the
5 treadmill comprises a frame, and two side-by-side
6 treadmills each having a continuous tread and first and
7 second ends. The first ends of the two treadmills are
8 pivotably supported on a base of the frame by a roller
9 shaft which extends through the treadmill rollers. The
10 second ends of the treadmills are independently supported
11 by spring-return hydraulic cylinders which are connected
12 between the treadmills and spaced support members of the
13 frame. The continuous treads are driven by a motor which
14 is coupled to the roller shaft. The two treadmills
15 alternately pivot up and down about the axis of the
16 roller shaft as a user treads thereon. In this manner,
17 the instant treadmill apparatus is operative for
18 providing the aerobic benefits of both walking and stair
19 climbing.

20 Accordingly, it is an object of the instant
21 invention to provide an exercise device which offers the
22 benefits of both walking and stair climbing.

23 It is another object to provide a treadmill having
24 dual treads.

25 It is still another object to provide a treadmill
26 having dual reciprocating treads.

1 It is yet another object to provide a treadmill
2 having two side-by-side treads which are pivotably
3 mounted to a frame at one end thereof.

4 Other objects, features and advantages of the
5 invention shall become apparent as the description
6 thereof proceeds when considered in connection with the
7 accompanying illustrative drawings.

8

9 **Description of the Drawings:**

10 In the drawings which illustrate the best mode
11 presently contemplated for carrying out the present
12 invention:

13 Fig. 1 is a perspective view of the instant
14 treadmill apparatus;

15 Fig. 2 is a fragmentary side view of one of the
16 spring-return hydraulic cylinders; and

17 Fig. 3 is a fragmentary side view of the drive
18 mechanism for the treads.

19

20 **Description of the Preferred Embodiment:**

21 Referring now to the drawings, the treadmill of the
22 instant invention is illustrated and generally indicated
23 at 10 in Fig. 1. As will hereinafter be more fully
24 described, the instant treadmill apparatus 10 includes
25 dual reciprocating treads which effectively provide the
26 benefits of both walking and stair climbing

1 simultaneously. The treadmill apparatus 10 comprises a
2 frame generally indicated at 12, first and second side-
3 by-side treadmills generally indicated at 14, first and
4 second spring-return hydraulic cylinders generally
5 indicated at 16, and a drive mechanism generally
6 indicated at 18.

7 The frame 12 is preferably constructed from tubular
8 steel, and it preferably comprises a rectangular base 20
9 and two spaced support members 22 which extend upwardly
10 from a central portion of the base 20. The base 20
11 includes two spaced upright arms 24 which are positioned
12 adjacent one end thereof. The support members 22 each
13 include a handlebar 26 which extends rearwardly from the
14 support member 22, and the support members 22 still
15 further include a U-shaped handle bar 28 which extends
16 forwardly therefrom.

17 The two treadmills 14 are identical in construction,
18 and they each preferably comprise a rigid treadmill
19 platform 30, rollers 32 rotatably mounted at each of the
20 first and second ends of the platform 30, and a
21 continuous tread 34 which extends around the platform 30
22 and is rotatably supported by the rollers 32. The
23 construction of the treadmills 14 is considered to be
24 conventional in the art, and therefore no further
25 description is thought to be necessary. The treadmills
26 14 are pivotably mounted to the frame 12 in side-by-side

1 adjacent relation by an elongated roller shaft 36 which
2 extends through the rollers 32 at the first ends of the
3 treadmills 14, and through the upright arms 24 on the
4 base 20. More specifically, the roller shaft 36 is
5 rotatably received through bearings (not shown) mounted
6 in the upright arms 24. In this regard, it can be seen
7 that the treadmills 14 pivot upwardly and downwardly
8 about the axis of the roller shaft 36. It is pointed out
9 that the roller shaft 36 is keyed to the rollers 32 for
10 corresponding rotation thereof. The second ends of the
11 treadmills 14 are supported in an inclined position by
12 the spring-return hydraulic cylinders 16. The spring-
13 return hydraulic cylinders 16 are conventional in the
14 art, and they preferably each comprise a body 38 which is
15 connected to a flange 40 on the outer side of the
16 treadmill platform 30, a rod 42 which is connected to a
17 tubular flange 44 on the spaced support member 22, and a
18 coiled return spring (not shown) which is mounted inside
19 the body 38. The flanges 44 are moveable up and down the
20 length of the support members 22 for adjusting the angle
21 of inclination of the treadmills. In this connection,
22 the flanges 44 further include a set screw 45 which
23 extends through a threaded aperture 46 in the flange 44
24 and engages with the support member 22 for setting a
25 position of the treadmill 14. The set screw 45 includes
26 an enlarged knob 47 to facilitate rotation of the set

1 screw 45. Alternatively, the flanges 44 can be
2 adjustable by means of a series of holes in the support
3 members 22 and a set pin which extends through the
4 flange 44 and one of the holes. The hydraulic
5 cylinder 16 provides resistance against extension of the
6 rod 42, and the return spring operates to return the rod
7 42 to its original position after extension. In this
8 connection, the coil spring supports the treadmill 14 in
9 a first normal inclined position (solid lines in Fig. 2)
10 while the hydraulic cylinder 16 resists downward pivoting
11 movement of the treadmill 14 from the first position to
12 a second position (broken lines in Fig. 2) when a user
13 places his weight thereon. The coil spring then returns
14 the treadmill 14 from the second position back to the
15 first position when the user removes his weight from the
16 treadmill 14. The hydraulic cylinders 16 each include a
17 rotatable adjustment cap 48 which is operative for
18 adjusting the resistance of the hydraulic cylinder 16.

19 It is contemplated that the spring-return hydraulic
20 cylinders 16 can be replaced by a torsion spring which is
21 received around the roller shaft 36. The torsion spring
22 would be adjustable to provide variable resistance to
23 downward movement of the treadmills 14. It is further
24 contemplated that the internal return springs of the
25 hydraulic cylinders 16 could alternatively comprise
26 external rubber bands which extend between the

1 treadmills 14 and the support members 22. In this
2 connection, the device would include a conventional
3 hydraulic cylinders to resist downward movement of the
4 treadmills 14 and rubber bands to return the
5 treadmills 14 to their original position. It is pointed
6 out that each of the spring return mechanisms must be
7 strong enough to return the treadmills 14 to their
8 original position before the user again steps thereon,
9 yet they should not be so strong as to immediately snap
10 the treadmills 14 back into position. In this
11 connection, the hydraulic cylinders 16 provide some
12 resistance during the return of the treadmills 14 so that
13 the upward and downward pivoting of the treadmills occurs
14 in a smooth transition.

15 The drive mechanism 18 comprises an electric motor
16 48 (Fig. 3) which is mounted to the base 20 of the frame
17 12. The motor 49 includes a rotatable drive shaft 50
18 which is coupled to the roller shaft 36 by means of a
19 belt and pulley transmission. The belt and pulley
20 transmission includes a transmission shaft 52 which is
21 rotatably captured in a bearing 54 which is mounted to a
22 flange 56 on the base 20 of the frame 12. The drive
23 shaft 50 is coupled to the transmission shaft 52 by a
24 first belt 58 which extends around a pulley 60 on the
25 drive shaft 50 and a pulley 62 on a first end of the
26 transmission shaft 52. The transmission shaft 52 is

1 coupled to the roller shaft 36 by a second belt 64 which
2 extends around a pulley 66 on the second end of the
3 transmission shaft 52 and a pulley 68 on an exposed end
4 of the roller shaft 36. In operation, rotation of the
5 drive shaft 50 causes rotation of the transmission shaft
6 52 which in turn causes rotation of the roller shaft 36,
7 the rollers 32 and the continuous treads 34. Since both
8 treadmills 14 are driven by a common roller shaft 36, the
9 continuous treads 34 are driven at the same speed.

10 The base 20 of the frame 12 preferably includes
11 rigid housing 70 which encloses the electric motor 48 and
12 which also functions as a step or platform from which a
13 user can step onto and off of the treadmills 14.

14 In operation, a user stands with one leg positioned
15 on each of the side-by-side treadmills 14, and then walks
16 on the treadmills 14 at a pace equal to the speed of the
17 continuous treads 34, i.e. in the same manner as a
18 conventional treadmill. As the user alternates his steps
19 and transfers his weight back and forth between the two
20 treadmills 14, the treadmills 14 alternately pivot up and
21 down against the resistance of the hydraulic cylinders
22 16. More specifically, when the user steps forward with
23 one foot onto the inclined end of the respective
24 treadmill 14, the treadmill 14 pivots downwardly about
25 the axis of the roller shaft 36 against the resistance of
26 the respective hydraulic cylinder 16. Thereafter, the

1 rotating tread 34 moves the user's foot rearwardly toward
2 the first end of the treadmill 14 until the user steps
3 forward with the opposite foot onto the inclined end of
4 the opposite treadmill 14 wherein the second treadmill 14
5 pivots downwardly and the first treadmill 14 is returned
6 upwardly to its original position by the return spring.
7 Accordingly, it can be seen that as a user treads upon
8 the treadmills 14, they alternately reciprocate up and
9 down in a manner similar to a stair climbing device.

10

11 The treadmill apparatus 10 is further provided with
12 an electronic control and monitoring device 72 which is
13 operative for controlling motor speed, and for measuring
14 and displaying time, horizontal distance travelled,
15 vertical distance travelled, calories burned, heart rate,
16 and other exercise variables. It is contemplated that
17 the electronic control device 72 can include a graphical
18 display which graphically charts the average inclination
19 being travelled by the user by extrapolating the
20 horizontal and vertical distances travelled. The control
21 device 72 is preferably mounted on the U-shaped handle
22 bar 28 so that it is readily accessible to the user
23 during operation of the treadmill 10.

24 While the preferred embodiment of the treadmill
25 device 10 includes a motor 48 for driving the treads 34,
26 the device 10 may also comprise an unmotorized embodiment

1 in which the inclined treadmills 14 are driven by gravity
2 and the weight of the user as the user's feet
3 alternatively step onto the treadmill 14

4 It can therefore be seen that the instant invention
5 provides an exercise device 10 which is effective for
6 simultaneously providing the exercise benefits of both a
7 conventional treadmill and a stair climbing apparatus.
8 The treadmill apparatus 10 includes dual side-by-side
9 treadmills 14 which operate in a conventional manner to
10 simulate walking. In addition, the dual treadmills 14
11 pivot up and down as a user treads thereon to
12 simultaneously simulate climbing stairs. The exercise
13 device 10 is simple in design, and construction, and it
14 is inexpensive to manufacture. For these reasons, the
15 instant invention is believed to represent a significant
16 advancement in the art which has substantial commercial
17 merit.

18 While there is shown and described herein certain
19 specific structure embodying the invention, it will be
20 manifest to those skilled in the art that various
21 modifications and rearrangements of the parts may be made
22 without departing from the spirit and scope of the
23 underlying inventive concept and that the same is not
24 limited to the particular forms herein shown and
25 described except insofar as indicated by the scope of the
26 appended claims.

Claims:

1 1. Treadmill apparatus comprising:

2 first and second adjacent treadmills each having a
3 continuous tread, and first and second ends;
4 a frame pivotably supporting the first ends of said
5 first and second treadmills;

6 first and second spring means for supporting the
7 respective second ends of said first and second
8 treadmills in a first position above a supporting
9 surface; and

10 first and second resistance means for resisting
11 downward pivoting movement of said first and second
12 treadmills from said first position to a second position
13 as a user's weight is placed upon said treadmills, said
14 first and second spring means returning said first and
15 second treadmills from said second position to said first
16 position when said user's weight is removed from said
17 first and second treadmills, said first and second
18 treadmills alternately pivoting up and down about said
19 first ends as a user treads thereon.

1 2. The treadmill apparatus of claim 1 further
2 comprising means for driving said continuous treads.

1 3. In the treadmill apparatus of claim 2, said first
2 and second treadmills having rollers at said first and
3 second ends for rotatably supporting said continuous
4 treads, said first ends of said first and second
5 treadmills being pivotably supported on said frame about
6 an axis of said rollers.

1 4. The treadmill apparatus of claim 3 further
2 comprising an elongated roller shaft which passes through
3 said rollers at said first ends of said first and second
4 treadmills, said roller shaft being rotatably supported
5 on said frame means.

1 5. In the treadmill apparatus of claim 4, said drive
2 means comprising a motor having a rotatable drive shaft
3 and transmission means for transmitting rotation of said
4 motor drive shaft to said roller shaft for rotation of
5 said rollers and said continuous treads.

1 6. In the treadmill apparatus of claim 1, said first
2 and second resistance means comprising first and second
3 hydraulic cylinders which are connected between said
4 frame and said first and second treadmills.

1 7. In the treadmill apparatus of claim 1, said first
2 and second treadmills having rigid treadmill platforms

3 for supporting said continuous treads thereon, said first
4 and second resistance means comprising first and second
5 hydraulic cylinders which are connected between said
6 frame and said treadmill platforms.

1 8. In the treadmill apparatus of claim 6, said frame
2 including a base and two spaced support members which
3 extend upwardly from said base, said first and second
4 hydraulic cylinders being connected between said spaced
5 support members and said treadmill platforms.

1 9. In the treadmill apparatus of claim 1, said first
2 and second spring means and said first and second
3 resistance means comprising first and second spring
4 return hydraulic cylinders which are connected between
5 said frame means and said first and second treadmills.

1 10. The treadmill apparatus of claim 5 further
2 comprising control means for controlling operation of
3 said motor.

1 11. The treadmill apparatus of claim 1 further
2 comprising electronic monitoring means for monitoring
3 time, horizontal distance travelled and vertical distance
4 travelled.

1 12. In the treadmill apparatus of claim 11, said
2 monitoring means including a graphical display for
3 graphically charting an average inclination being
4 travelled by a user.

1 13. In the treadmill apparatus of claim 8, said first
2 and second hydraulic cylinders each having a first end
3 which is connected to a first flange on said treadmill
4 platforms and a second end which is connected to a second
5 flange on said spaced support members, said second flange
6 being adjustably moveable on said support member for
7 adjusting an inclination of said treadmill.

1/2

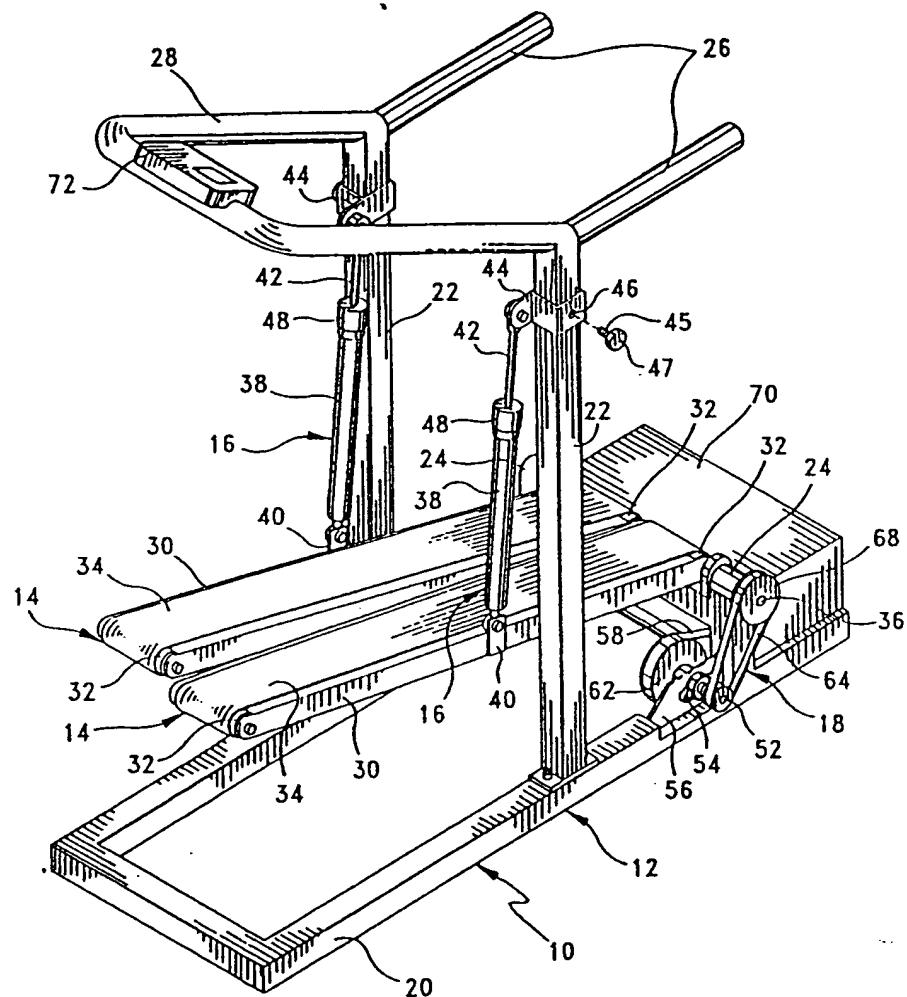


FIG. 1

2/2

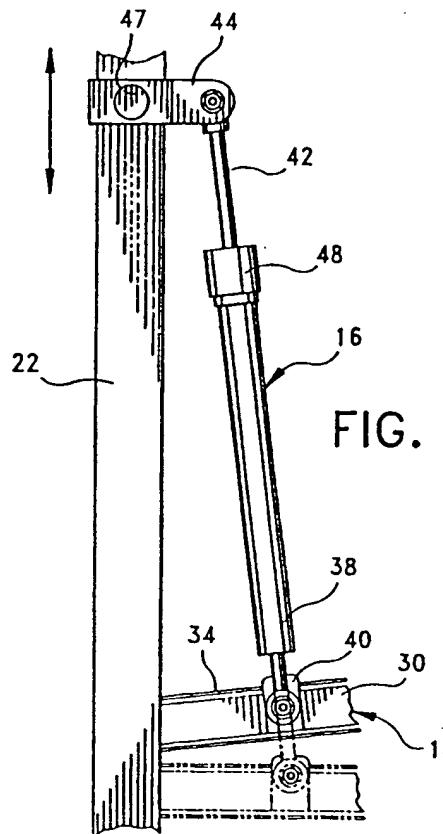


FIG. 2

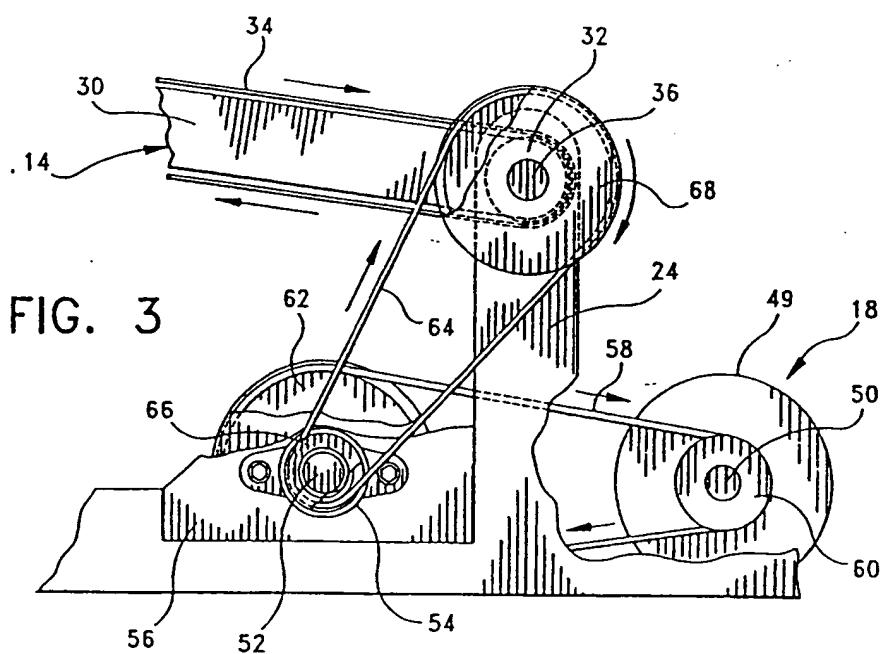


FIG. 3

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US94/14694

A. CLASSIFICATION OF SUBJECT MATTER

IPC(6) :A63B 22/00, 22/04
US CL :482/51, 52, 54

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 482/51-54

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
NONE

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
NONE

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US, A, 5,160,302, (LI), 03 November 1992. See the entire document.	1-13
A	US, A, 4,204,673, (SPEER, SR.), 27 May 1980. See the entire document.	1-13
A	US, A, 4,938,473, (LEE ET AL.), 03 July 1990. See the entire document.	1-13

Further documents are listed in the continuation of Box C. See patent family annex.

* Special categories of cited documents:	
A document defining the general state of the art which is not considered to be part of particular relevance	"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
E earlier document published on or after the international filing date	"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
L document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reasons (as specified)	"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
O document referring to an oral disclosure, use, exhibition or other means	"Z" document member of the same patent family
P document published prior to the international filing date but later than the priority date claimed	

Date of the actual completion of the international search	Date of mailing of the international search report
01 FEBRUARY 1995	27 MAR 1995
Name and mailing address of the ISA/US Commissioner of Patents and Trademarks Box PCT Washington, D.C. 20231	Authorized officer <i>Stephen Crow</i> STEPHEN CROW
Faxsimile No. (703) 305-3230	Telephone No. (703) 308-3398